

U.S. Patent Application No. 10/708,867
Preliminary Amendment dated March 15, 2005

AMENDMENTS TO THE CLAIMS

Claims 1-17 (canceled)

Claim 18 (new): A system for use in achieving distributed data storage over a computer network comprising:

a storage server system comprising one or more storage servers that each comprise a data storage device and a network interface for communicating with one or more application clients that will require data storage and at least one management storage server; and

a management server system comprising one or more management storage servers that each comprise a network interface for communicating with an application client and each of said storage servers;

each of said management servers and each of said data storage servers comprising a data storage configuration identifier whose value is indicative of an allocation of data storage within said storage server system at a point in time, the allocation of data storage within said storage server system comprising one or more virtual volumes of data storage distributed over one or more of said storage servers;

wherein each of said management storage servers is capable of providing a first value for said data storage configuration identifier to an application client and each of said storage servers, and each of said management storage servers is capable of asynchronously providing a second value for said data storage configuration identifier to the application client and to each of said storage servers after there is a change in the allocation of data storage within said storage server system; and

wherein each of said storage servers is capable of: (a) comparing a value for said data storage configuration identifier which is associated with a data storage related request received from an application client with said second value for said data storage configuration, and (b) when the values are not equal, providing an indication to a management storage server that the values are not equal.

Claim 19 (new): The system, as claimed in claim 18, wherein said management storage server is capable of providing an updated data storage configuration to a data storage

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configuration identifier to said storage server when an indication is provided that the values are not equal.

Claim 20 (new): The system, as claimed in claim 18, wherein each of said storage servers is further capable of reporting an error back to the application client when the values are not equal.

Claim 21 (new): The system, as claimed in claim 20, wherein each of said storage servers is further capable of receiving an updated allocation of data storage within said data storage server system from a management storage server, evaluating said updated allocation to determine if data integrity within the data storage server will be adversely affected by the updated allocation, and return a vote to said management storage server approving of the allocation change when the data integrity is not adversely affected.

Claim 22 (new): The system, as claimed in claim 21, wherein when the updated allocation is approved, each of said storage servers is further capable of determining if data stored at the respective storage servers is required to be moved as a result of the updated allocation and moving the data that is to be moved as a result of the updated allocation.

Claim 23 (new): The system, as claimed in claim 18, wherein the allocation of data stored at said storage servers is not synchronized between one or more storage servers for an indeterminate period of time.

Claim 24 (new): The system, as claimed in claim 18, further comprising a driver for associating with an operating system of an application client, wherein said driver comprises a configuration map that is capable of identifying one or more of said storage servers containing data to be accessed by the application client.

Claim 25 (new): The system, as claimed in claim 24, wherein said allocation of data within said data storage system includes providing data stored at one or more of said storage servers be replicated to one or more other of said storage servers.

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Claim 26 (new): The system, as claimed in claim 25, wherein said driver is capable of initiating a read process to read data from said storage server system and determining based on said configuration map a source storage server to read said data from.

Claim 27 (new): The system, as claimed in claim 26, wherein said data is stored on two or more storage servers and said driver selects said source storage server based on a performance load metric.

Claim 28 (new): The system, as claimed in claim 25, wherein at least a first storage server has a failure and said driver is capable of determining other storage servers that are available to service data storage related requests from an application client.

Claim 29 (new): The system, as claimed in claim 28, wherein when said failed first storage server recovers from said failure, said first storage server is operable to determine data that needs to be moved to and from said first server in order to recover from said failure.

Claim 30 (new): The system, as claimed in claim 25, wherein said storage servers are further operable to perform copying of data between servers asynchronously.

Claim 31 (new): The system, as claimed in claim 30, wherein said storage servers are further operable to perform copying from one storage server to multiple other data storage servers.

Claim 32 (new): The system, as claimed in claim 25, wherein said storage server system is operable to perform data movement between data storage servers while continuing to receive and respond to data storage related requests received from application clients.

Claim 33 (new): The system, as claimed in claim 32, wherein said data movement comprises generating a snapshot of data stored at a first virtual volume stored across at least a first storage server and copying said snapshot to at least a third storage server.

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Claim 34 (new): The system, as claimed in claim 33, wherein said snapshot is generated by designating data stored at said first storage server as snapshot data, and performing read and write operations to said first virtual volume on a new layer.

Claim 35 (new): The system, as claimed in claim 18, wherein a first management server is capable of proposing a change to the number of storage servers in said storage server system, and at least a second management server is capable of evaluating the change and providing a vote indicating approval or disapproval of the change.

Claim 36 (new): The system, as claimed in claim 35, wherein when evaluating the change, said second management server determines if the change would adversely affect the ability to implement one or more certain storage functions.

Claim 37 (new): The system, as claimed in claim 36, wherein one of the storage functions is replication of data between a storage server and another storage server.

Claim 38 (new): The system, as claimed in claim 18, wherein said storage servers are distributed across a network and are operable to provide shared read and write access to other components on the network.